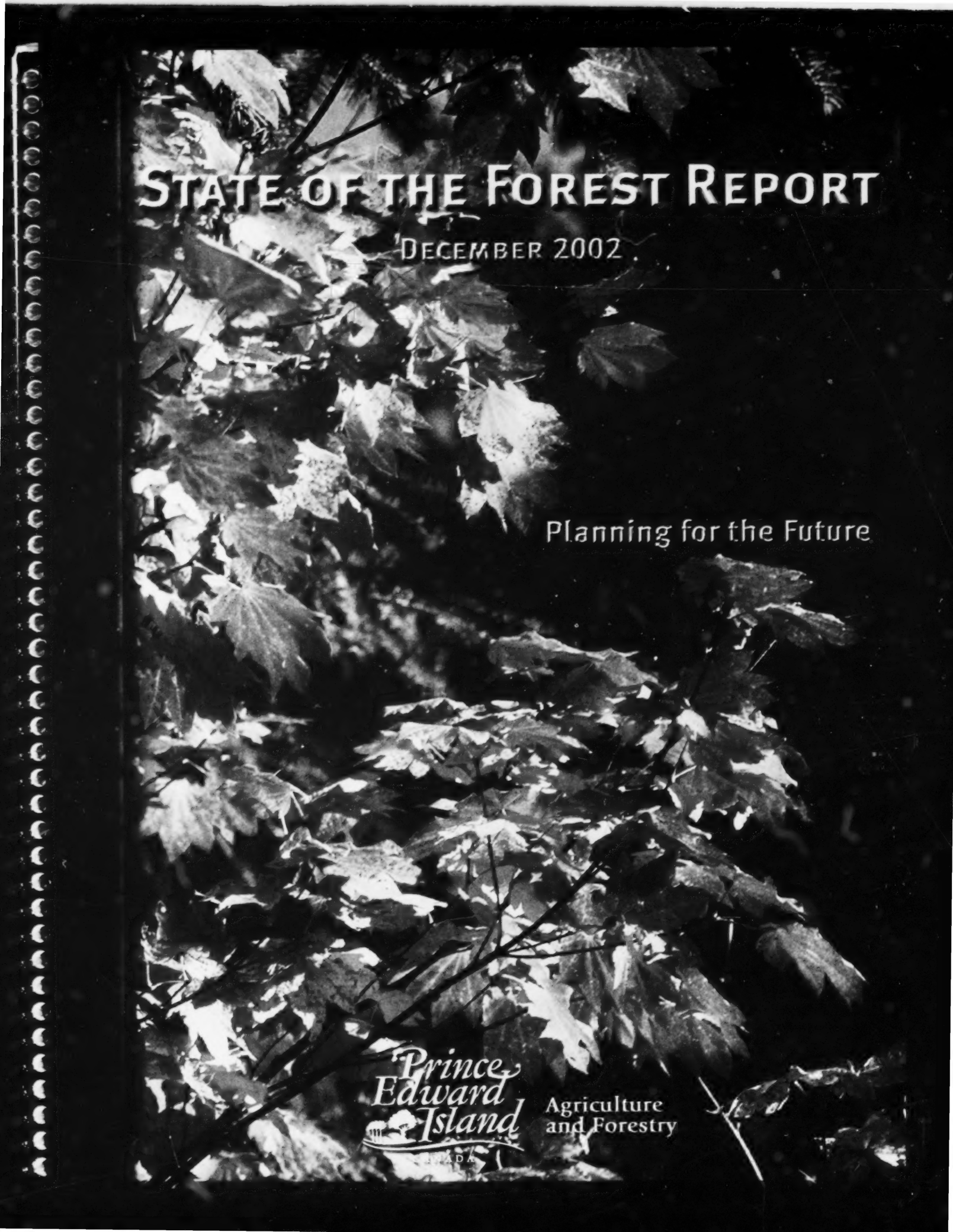
STATE OF THE FOREST REPORT
DECEMBER 2002
Planning for the Future
Prince Edward Island
Agriculture and Forestry

STATE OF THE FOREST REPORT 1990 – 2000

Planning for the Future

Prepared in compliance with the *Forest Management Act*
of the Province of Prince Edward Island, R.S.P.E.I. 1988
Chapter F-14

Prepared by
The Prince Edward Island Department of Agriculture and Forestry
Forestry and Land Resource Modelling Division

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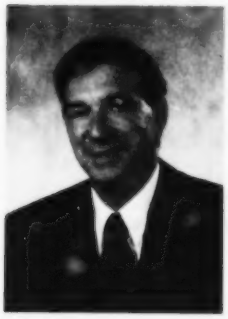
A Message From the Premier and the Minister



As Premier of the province and Minister responsible for Agriculture and Forestry respectively, we are pleased to release to the public the State of the Forest Report for the period 1990-2000. This is Prince Edward Island's second State of the Forest Report and we are proud to recognize that it is one of the most comprehensive in Canada, meeting or exceeding national forest inventory criteria and standards. The base data will also serve as a powerful tool to analyze our management options for the many values forests provide to all of us.

This report builds on the basic information contained in the State of the Forest Report completed in 1992, which covered the period 1980 to 1990, and offers many new insights into a wide range of forest values and resources. The report is a result of several years of hard work and dedication by staff from the Department of Agriculture and Forestry who strived to provide Islanders with the best information possible.

Over the last 10 years, the Island's forest area declined by some six per cent. This decline was primarily caused by the conversion of private forest lands to agricultural uses. As well, forest harvest activity, spurred on by increased market demand, plus natural softwood mortality, served as a catalyst for the conversion of the commercial softwood resource. The majority of this activity occurred on private land; and, while it provided industry and landowners with excellent economic returns, it has had dramatic impacts on our landscape and the other values of PEI's forest.

The State of the Forest Report provides a snapshot, a picture in time, of the Island's public and private forests and explores how our forests have changed during the last 10 years. The report also provides scenarios on how these changes could affect our economy and environment for decades to come and what we as a society could do to influence these factors. This report will be vital to landowners, resource managers, policy makers, industry and, indeed, every Islander who is concerned about our collective forest resource.

Forests lend character to our landscape, provide critical habitat for many species of plants and animals, locations for hiking and camping, and healthy buffer zones along streams. Society is increasingly demanding that forests be seen as more than a simple commodity, but how do we distinguish each of these values and ensure that they are respected?

Therefore, we encourage all Islanders to read this report carefully, reach their own conclusions on the state of our public and private forest lands, and offer their ideas on what the future forests could provide to all of us.

Pat Binns
Premier

Mitch Murphy
Minister

Executive Summary

Forests represent the largest component of the Island's land base, covering some 263,000 hectares. Although forest based industries have generated considerable economic activity over the past decade, it is important to realize that forests are being increasingly appreciated for their non-timber qualities. Forests are integral to our landscape, wildlife, ground water, air quality, recreation potential and many other values that matter to the people of this province.

Since the release of the 1990 Forest Inventory the area of forest has diminished (roughly 6 per cent), primarily due to conversion to agriculture. The area of mixed and tolerant hardwood covertypes has increased while mixed softwood covertypes have decreased.

Computer based forest growth models indicate that the Island's forest industry will experience a serious decline in the availability of softwood sawlogs beginning in this decade. Even with significant silvicultural inputs, this situation will last for several decades.

By the late 1990s the softwood sawlog harvest volume had more than tripled compared to figures from the beginning of the decade. Pulpwood harvest volumes also doubled over this period. The primary factors for the harvest increases were the conversion of forest land to agricultural uses, technological changes within the milling and logging sectors, and unparalleled lumber markets in the United States. Hardwood harvests remain below the annual growth rate and much of the current cut originates as a by-product of softwood harvests in mixedwood covertypes.

A new Permanent Inventory Plot (PIP) methodology has been established, which builds on a National Forest Inventory grid system. The Corporate Land Use Inventory process established some 1900 inventory plots across PEI with 803 situated in forest cover. These plots will be revisited in future to identify and compare land use trends with the results of previous surveys. The plots also provide information on soil quality, stand structure, plant diversity and much more.

While Prince Edward Island's forest area has increased by almost 50% since 1900, the forest of today faces demands and expectations that were not an issue years ago. For instance, ground water use has increased significantly during the last 100 years. The recognition society gives to the role of forests in water recharge and many other societal outcomes has also increased. Thus, forests are increasingly valued for their role in our landscape, for their recreational potential, and for their critical role in our Island environment and indeed the global environment. Forests play an intimate role in our health and lifestyle, so government will increase its focus on these and many other forest values in the years to come.

Résumé

Les forêts représentent la plus large composante de la superficie de l'Île : elles couvrent près de 263 000 hectares de terre. Même si les industries axées sur les ressources forestières ont généré une activité économique considérable au cours de la dernière décennie, il est important de réaliser qu'on apprécie de plus en plus les forêts pour leurs qualités autres que le bois. Les forêts forment une partie intégrante du paysage, de la faune, de la nappe souterraine, de la qualité de l'air, du potentiel récréatif et de plusieurs autres valeurs importantes pour les habitants de notre province.

Depuis la publication de l'inventaire des forêts de 1990, la surface forestière a diminué de plus ou moins 6 %, surtout en raison de sa conversion à des fins agricoles. La superficie couverte par des types de bois mixte et tolérant a augmenté alors que celle des types de bois mous a diminué.

Les modèles informatiques de croissance de forêts montrent que l'industrie forestière de l'Île sera témoin au cours de la présente décennie d'une forte diminution des billes de sciage de résineux. Même avec les facteurs de production sylvicole, cette situation prévaudra durant plusieurs décennies.

À la fin des années 1990, le volume de la récolte de billes de sciage de résineux avait plus que triplé par comparaison aux chiffres du début de la décennie. Les volumes de production du bois à pâte ont également doublé au cours de la même période. Les facteurs primaires des augmentations de récolte étaient la transformation des terrains forestiers à des fins d'usage agricole, les changements technologiques dans les secteurs du traitement et de l'exploitation de la forêt et un marché des sciages sans pareil aux États-Unis. Les récoltes de bois dur demeurent sous le taux de croissance annuel et une bonne partie de la coupe actuelle vient d'un sous-produit des récoltes de bois mou dans les types de bois mixte.

On a développé une nouvelle méthodologie par placette d'échantillonnage permanent (PÉP), laquelle s'appuie sur un Inventaire forestier national par quadrillage. Le processus d'inventaire de l'utilisation du sol collectif a identifié environ 1900 placettes d'inventaire à l'Î.-P.-É. dont 803 étaient situées sous le couvert forestier. Ces placettes seront de nouveau visitées plus tard afin d'identifier et de comparer les tendances d'utilisation du sol avec les résultats des enquêtes précédentes. Les placettes fournissent également des renseignements sur la qualité du sol, la structure de peuplement, la diversité des plantes et dans bien d'autres domaines.

Bien que la superficie forestière de l'Île-du-Prince-Édouard ait presque doublé depuis 1900, la forêt d'aujourd'hui fait face à des demandes et à des attentes qui n'étaient pas un problème dans le passé. Par exemple, l'utilisation des eaux souterraines a beaucoup augmenté au cours des 100 dernières années. La reconnaissance accordée par la société au rôle des forêts dans la reconstitution de l'eau et dans plusieurs autres résultats sociaux a également augmenté. En conséquence, les forêts sont de plus en plus valorisées pour leur rôle dans notre paysage, pour leur potentiel récréatif et pour leur rôle critique dans notre environnement insulaire et même dans l'environnement global. Les forêts jouent un rôle intime dans notre santé et notre style de vie; c'est pourquoi le gouvernement augmentera son attachement à ces valeurs et à biend'autres valeurs forestières dans les années à venir.

Introduction

The 1988 *Forest Management Act* requires the department to prepare a State of the Forest Report every ten years. Clause 6 of the act reads:

The Minister shall monitor forest growth and, in 1992 and every ten years thereafter, shall provide to the Lieutenant Governor in Council a State of the Forest Report which includes:

a) an inventory of the forest in the province identifying the area of the forest by covertype, the volume of forest products available in the forest, the age distribution of the forest, and an estimate of the growth by product type that the forest can sustain with and without management;

b) a summary of the forest management activities for both Crown forest lands and private land implemented during each year of the ten year reporting period;

c) an estimate of the wood supply shortfalls or surpluses based on projections of forest growth and demand for forest products;

d) an outline of programs proposed to manage the forest in the next reporting period; and

e) such other information as may be prescribed by regulations.

This is the Island's second such report and builds on the 1990 report. It was prepared as part of the Corporate Land Use Inventory (CLUI) that was undertaken to meet the needs of a number of government and non-governmental agencies. Ducks Unlimited, the departments of Agriculture and Forestry, Environment, Provincial Treasury, Transportation and Public Works, and other agencies funded parts of the CLUI in order to acquire photography and to develop detailed computer based, mapable layers of information specific to each agency's needs.

A series of reports followed the 1990 State of the Forest Report, in which more detailed analysis of biological data, collected through the course of the inventory, was undertaken through partnerships with individual researchers and the department. The department is prepared to entertain similar such information sharing with research oriented partners.

Methodology

Infrared aerial photography was flown in July and August 2000 at a scale of 1:17,500. The images were scanned digitally and used to create the first provincial coverage of digital orthomaps of such a scale in Canada. The aerial photography was interpreted for landuse/landcover and this information was transferred digitally to the orthomaps. Infrared photography has been chosen historically on PEI as it emphasizes differences between tree species and improves the detection of vegetation stress such as insects and disease.

While aerial photography provides the geographic and attribute content of the forest, Permanent Inventory Plot (PIP) data provides the information from which the statistical image of the forest is built. In 1999 the Province committed itself to cooperate in the National Forest Inventory (NFI), an initiative designed to compile a macro picture of what comprises Canada's national forest estate. The NFI 10-kilometer grid dictated that there would be 14 PIP locations on PEI, hardly enough from which to build a model of Island forests. Using the national grid as a framework, staff improved the modelling capability by laying out a 2 km. grid with an associated network of 803 plots in forest cover. These plots were located and permanently marked using G.P.S. technology.

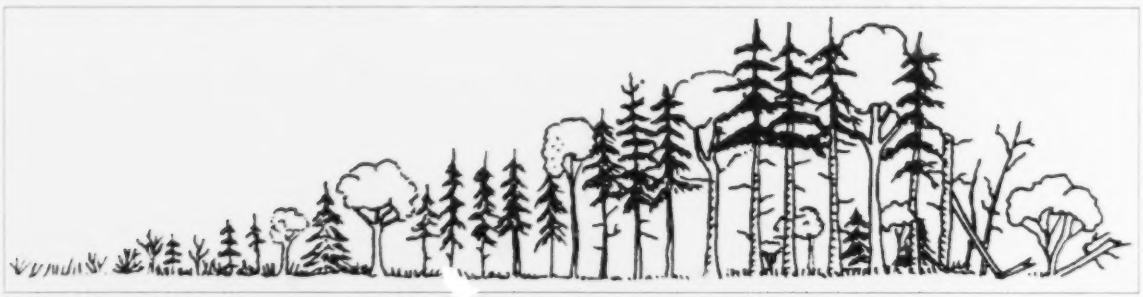
The PIP's will enable future surveys to statistically assess the land use and forest cover changes that take place over time. The forest inventory itself involves the measurement of typical forestry variables of tree species, ages, growth rates, physical stature (heights and diameters), form, numbers, and product potential. Field measurements also involve the collecting of soil samples and the describing of soil profiles; the cataloguing of ground vegetation (from lichens and mosses to small shrubs); the conducting of woody debris surveys (as part of a carbon sequestration database development); along with the listing of wildlife related observations such as evidence of nesting or nesting cavities. The wealth of information gathered is beyond the capability of one agency to evaluate; hence, the Department has partnered with educational and research interests to produce publications such as was the case with Dr. Doug Sobey following the 1990 forest inventory. Dr. Sobey used ground vegetation information to produce a four-part study of plant communities and relationships within Island forests.

In comparison to the 1990 Forest Inventory, the 2000 CLUI captured significantly more information on PEI land use. A committee comprised of individuals from several government departments finalized the interpretation standards for forestry, agriculture, wetlands, residential and urban land uses. The increased level of intensity in the field survey, the aerial photo interpretation and the digital mapping create accurate databases, but also create some problems in comparing information with previously gathered data. Categories of land use in 1990 may now be further divided into multiple groupings, hence making some direct comparisons inappropriate. In other instances the criteria for evaluation may have changed although the finished product may appear to be the same, as was the case with the product quality assessment of forest products.

For photo interpretation purposes, an area has to have an identifiable forest cover or forest use in order to be categorized as forest land.

Thus, a cutover area would still be considered forest land if there was no evidence to the photo interpreters that any activity was taking place to remove the root systems or establish a non-tree crop or use. In the case of cleared land, which has been abandoned, it would remain in a non-forest category until such time as forest species regeneration was visible to those interpreting the aerial photographs for forest covertypes.

Figure 1: Stand progression from abandoned land to over mature forest.



Information derived from the CLUI will be available to all agencies requesting digital data. Hardcopy maps of forest covertypes will be placed in all District Forestry Offices for public use, while other digital information will be made available to the public through the Internet Landowners will be able to access their own forest cover information via the maps at the District Forestry Offices or via the Internet.

This State of the Forest Report is just one example of how the forest inventory and the corporate land use inventory have practical application. The forest inventory will also have value in the development of a vision of the forest that will be applicable ten years and more into the future. The information provides comparisons with the past and allows projections into the future. The computer models used to grow the next forest are based on the knowledge of the current forest derived from the CLUI and the PIP information. This information will allow strategies and inputs to be tested to assess their impact down the road. The Department looks forward to partnering with organizations that can utilize the forest inventory database to better understand the forest resources of the Province and the relationships with other aspects of the natural and human-made environment on PEI.

Staff of the Land Resource Modeling Section of the Department produced this report with the assistance of specialized contract inputs for such aspects as the aerial photography and photo interpretation. Growth and yield information from the roughly 300 Permanent Sample Plots which the Department has been tracking for over 20 years contribute to the periodic updating of computer models used to project the growth of the forest over the coming decades.

History 1990-2000

The period from 1990 to 2000 was a time of dramatic change for the Island's forest community. This report primarily deals with the forest changes that took place from a sustainable forest production perspective. The methodology used limits the ability to directly assess some of the greater societal benefits of forests.

Decline of the Biomass and Small Sawmill Industries – The forest biomass industry, which seemed to hold many market opportunities for woodlot owners and logging contractors in the 1980s, was decimated by the decline of world oil prices in the mid-90s and the resulting closure of many of the biomass-fired furnaces that had been built during the previous decade. By the late 1990s, domestic fuelwood demand began to rise as world oil prices again made domestic wood fuel competitive.

The number of small, community-based sawmills continued to decline over the decade. However, while the number of mills was down, softwood lumber production rose some 300 per cent over the decade. Today, the three largest mills account for about 90 per cent of the roughly 60 million board feet of softwood lumber produced on the Island annually.

Loss of FRDA and Establishment of the Forest Renewal Program – In 1993, the Federal Government terminated the Forest Resource Development Agreement (FRDA) that had been the primary tool for the advancement of forest management in PEI. The F.R.D.A. had put as much as $5 million per year into forest improvements on the Island.

The province responded to the loss of federal funding by implementing the Forest Renewal Program in the mid 1990s. Government funded roughly 70 per cent of the cost of reforesting harvested areas. Industry contributed a checkoff fee of $2 /cord for all softwood harvested and processed or exported from PEI, while participating landowners paid a $100/ha. Plantation Establishment Fee, to cover the remaining 30 per cent.

Unfortunately, participation by landowners was not as great as had been hoped, with tree planting numbers remaining at about 2.5 million seedlings per year. This was sufficient to plant about 30 per cent of the harvest sites on private land.

Conversions – Of the 31,700 hectares of forest that were harvested between 1990 and 2000, roughly 10,500 hectares were converted to agricultural use. In the mid-1990s, the Island's blueberry industry began a drive to expand the area under production. This expansion led to the conversion of young forest plantations in several areas of the Island. Land clearing for potato production also experienced a major increase, particularly in several key watersheds where forest cover was already under some pressure.

Increased Industry Activity and Productivity – The forest industry has been a leader in the use of computer and robotic technologies for the production of forest products. This technology may be seen in the mechanized harvesting machines, which have replaced most of the manual felling operations, and scanning devices in sawmills that optimize lumber processing from small diameter logs.

Improved technology in the Island's harvesting and processing sectors caused the province to change its sustainable harvest projections in the mid 90's. Log scanning devices in the larger sawmills allowed smaller diameter logs to be processed, while mechanical harvesters were able to economically harvest stands that had softwood volumes that were too low to be commercially viable for manual operations. Therefore, technology changes of the 1990s allowed the industry to sustain, for the short term, a harvest level that was considerably greater than would have been the case based on 80's technologies.

Hardwood Industries – The secondary forest product manufacturing sector, primarily hardwood using enterprises, also grew dramatically in the last half of the decade. Kiln drying, engineered wood products, and other value added wood products contributed upwards of $25 million dollars annually to the provincial economy. The infrastructure to utilize quality Island grown products is now in place, but the ability of the local forest industry to provide the raw product in sufficient volumes is limited.

Self-sufficiency in Seed Production – Tree improvement initiatives begun in the mid 1970's came to fruition in the 90's when the Dover Seed Orchard began to produce virtually all the conifer seed for the Island's reforestation programs. Initial growth measurements suggest volume and height gains, through genetically improved seed in the order of 20 per cent. An added benefit to the genetic improvement program was an increase in the habitat available for softwood browsing species. This program increases the size of both the tree canopy and the trunk diameter, which provide increased habitat area for those species using these forest niches.

Round Table on Resource Land Use Report – In 1997, the Round Table on Resource Land Use and Stewardship released its final report to the public. The report contained a number of recommendations for the Island's forest community, including one for the establishment of a Code of Practice for the harvest of Island forests.

The Department, in cooperation with members of the Island's forest community, developed and introduced a voluntary Code of Practice for Forest Contractors. This code was designed to provide the harvest industry with a set of business, forest harvesting and forest environmental guidelines and standards. Unfortunately, the level of compliance was not high, so in 1998 the Department and forest stakeholders began to develop proposals for a regulated Code. However, landowner resistance and lack of public support led government to withdraw the proposal in early 2000.

After public consultation, Provincial Forests were proclaimed in 2000. Government reviewed its land holdings and identified lands surplus to its needs. The revenues were reinvested in strategic land acquisition as suggested by the Round Table report. The number of community level public forest partnerships, particularly involving forest recreation, dramatically increased.

Non-traditional Forest Products – There was interest, but little commercial development of such undertakings as forest mushroom harvesting, balsam fir tipping for wreath making and maple syrup production. The few enterprises, which are operating, do not constitute industries, but they do illustrate that entrepreneurial initiative can break the mold of looking at the forest from a timber perspective.

Ground hemlock is another non traditional forest crop that has gotten landowners to think of their forests as more than just trees. Research done by the Department, in the latter part of the decade, suggests that sustainable harvest amounts in the order of 1.4 million pounds could be generated annually. The pharmaceutical industry has shown serious interest in the potential of such crops for use in the production of paclitaxel, a cancer treatment, which is growing in application each year. Cultivation of this crop in a plantation context is seen as a future possibility.

Sustainability and Management Issues – Prince Edward Island's forest landscape is largely defined by old-field boundaries and practices from the past. Plant and natural area conservation requires an understanding of plant succession. Dr. Doug Sobey, an Islander and professor at the University of Ulster in Northern Ireland, analyzed the forest inventory plant information from the 1990 survey and developed a new plant relationship system for the Island's forests. This system was subsequently used by the Island Nature Trust and the Natural Areas Protection Act's Technical Advisory Committee to analyze the forest cover and identify forest types that were under-represented in the Island's Significant Environmental Areas Program. Dr. Sobey also used this information to compare the various plant abundance rating schemes used on the Island.

The discontinuation of the Forest Resource Development Agreement led many silviculture companies to change their focus to softwood harvesting. During the 1990s, markets increased dramatically, sawing technology reduced the size constraints on studwood, and mechanical harvesters largely eliminated the problem with finding chainsaw operators. Public concern over both the scale of the harvest and the amount of harvesting grew steadily. The Department of Agriculture and Forestry prepared analyses of the harvest level and these studies re-affirmed an impending softwood supply shortage. In addition, the Department advocated the retention of young, healthy softwood stands.

The public concern for forest sustainability was also influenced by extensive debate over global warning, declines in the populations of migratory (neotropical) forest birds, increasing frequencies of fish kills from nutrification and pesticides, significant forest and hedgerow land clearing on Prince Edward Island, growing concern over water recharge, ground water quality, biodiversity and other factors.

Land Use

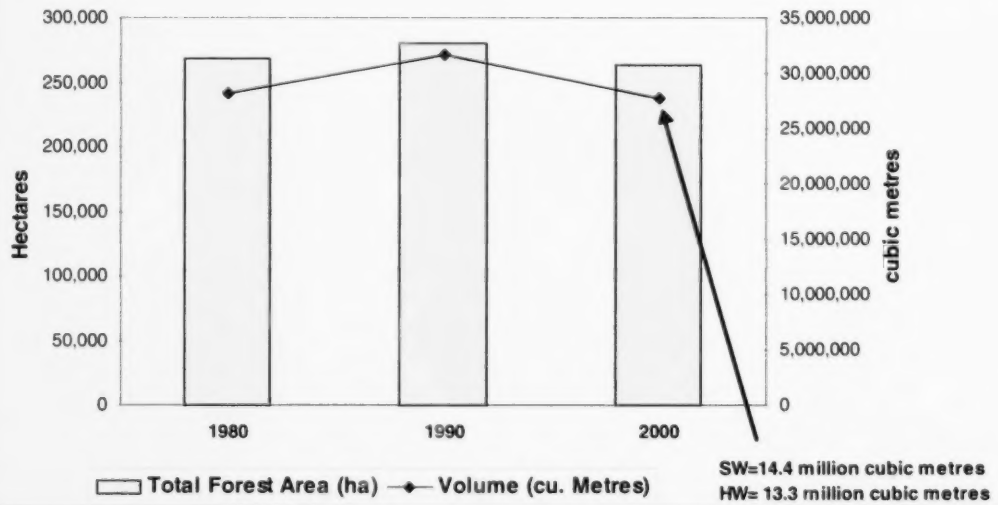
The Island's total area, as indicated in this report, has decreased from the figures reported in the 1990 report. This loss can be primarily attributed to a change in the definition of land from a mean high tide determinant to effectively what would be called the 'bank.' Historical records indicate that at the first of the previous century, forest lands represented about one third of the land mass. By 1990, forest cover grew to represent almost 48 per cent of the area of PEI. Forests now cover roughly 45 per cent. These changes represent some of the dynamics associated with the resource.

Table 1

Primary Land Use Breakdown		
	Hectares	Per Cent
Forest	256,780	45.2
Agriculture	222,186	39.1
Abandoned Farmland	16,142	2.8
Wetland	36,293	6.4
Transportation	12,587	2.2
Other	24,372	4.3
Total PEI	568,360	100.00

In terms of the forest resource, there was a decrease in the area categorized as forest as well as the volume of standing timber (Figure 2) since the 1990 report. By combining the area of the various forest classifications and wetland forests, Prince Edward Island was determined to have 256,780 ha. of forest and 6,446 ha. of forested wetland for a total forest area of 263,226 hectares (Table 1). This represents a loss of about 6 per cent from the 280,017 hectares of forest land identified in 1990. On the other hand, agricultural land increased by roughly17,200 hectares.

Figure 2 **Forest Area / Volume Comparisons**



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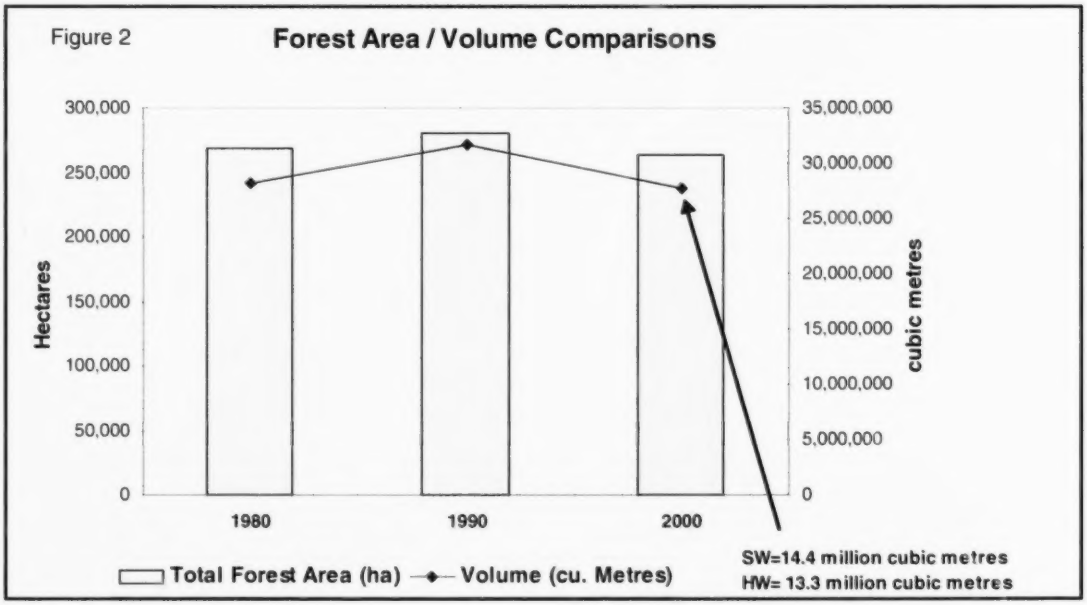


The definition of 'forest' deserves some clarification for those who will study this report. In this report, land was considered forested if it was either high forest with trees dominating the area, or if it was in a regeneration phase, including old fields with trees just becoming visible, or was a clear-cut with no visible evidence of conversion to a non-forest land use.

The map below gives a visual representation of the forest areas that were harvested and converted to non-forest uses since 1990. The map as well shows those areas that in 1990 were not categorized as forest, but which in 2000 were identified as being in forest cover.

Figure 3 (See Appendix III for larger version)

Forest Area Conversions and Accretions Since 1990

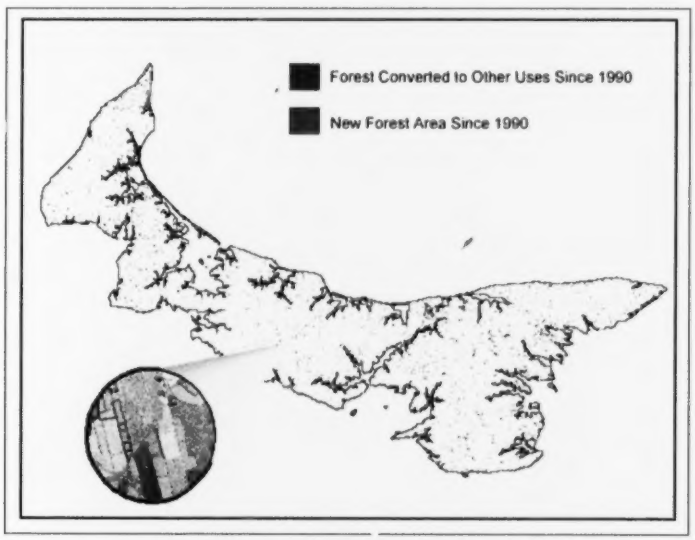
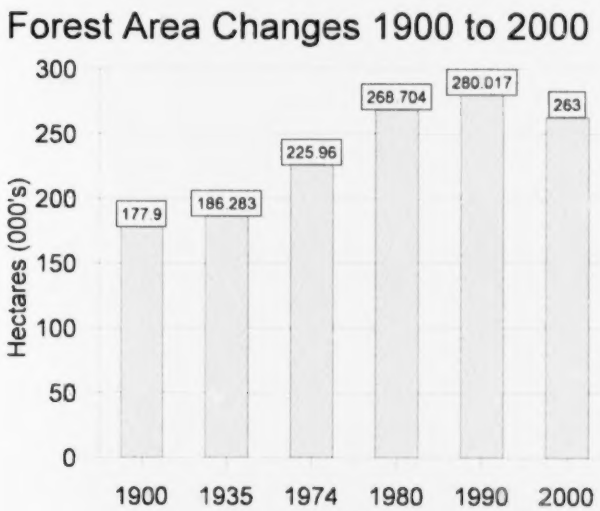


Figure 4



Forest Land Ownership

"Unlike most Canadian provinces, the majority of Prince Edward Island's forest land is privately owned." [1] Using forest covertype maps from the 1990/92 forest inventory and Real Property Records Division property mapping data dated July 2001, Forestry and Land Resource Modelling Division staff were able to determine a number of ownership statistics for forest land on PEI.

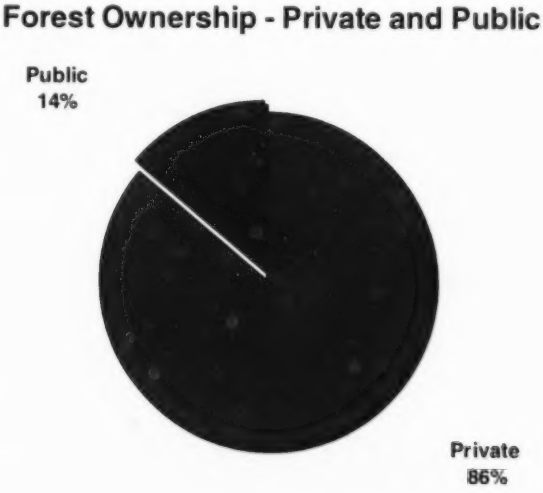
As of July 2001, there were 39,661 forested properties on PEI. Of these, 15,621 were less than 0.5 ha. in size and totalled only 2,374 ha., thus they were removed from the analysis.

Table 2 – Land Ownership Statistics

Ownership	# of Parcels	Area of Forest (ha.)	Per Cent of Total Forest
Private PEI	19,675	207,666	76.0
Private other Cnd.	1,573	14,674	5.4
Private US	1,101	12,510	4.6
Private other Nat'ns	53	659	0.2
Provincial Gov't	1,389	33,282	12.2
Federal Gov't	78	2,067	0.8
Community Gov'ts	171	2,239	0.8
	24,040	273,097	100.00

The average size of privately owned forest holdings was 14.3 ha. The bonafide farming community was determined to own or lease 37.4 per cent of the private woodland while urban owners held 11.4 per cent of the private forest land base.

Figure 5



The table below illustrates some of the main reasons that survey respondents gave for owning their woodland properties as reported in the study The Woodlot Owners of Prince Edward Island: A Survey of Their Forest Use, Management and Values[2].

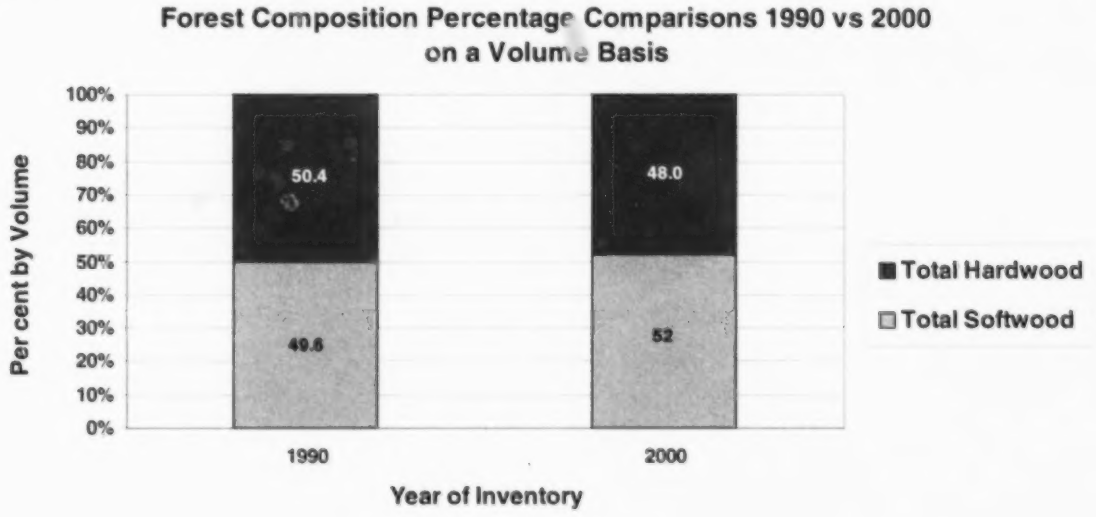
Table 3

Main Reason For Owning Woodland	Per Cent
Part of home or farm property	29.5
Inherited / a gift	13.0
Personal use / enjoyment (e.g., aesthetics)	9.1
Firewood only	8.8
Part of vacation or shorefront property	5.8
Other (Production, conservation, speculation, etc. - none	33.8

Covertypes

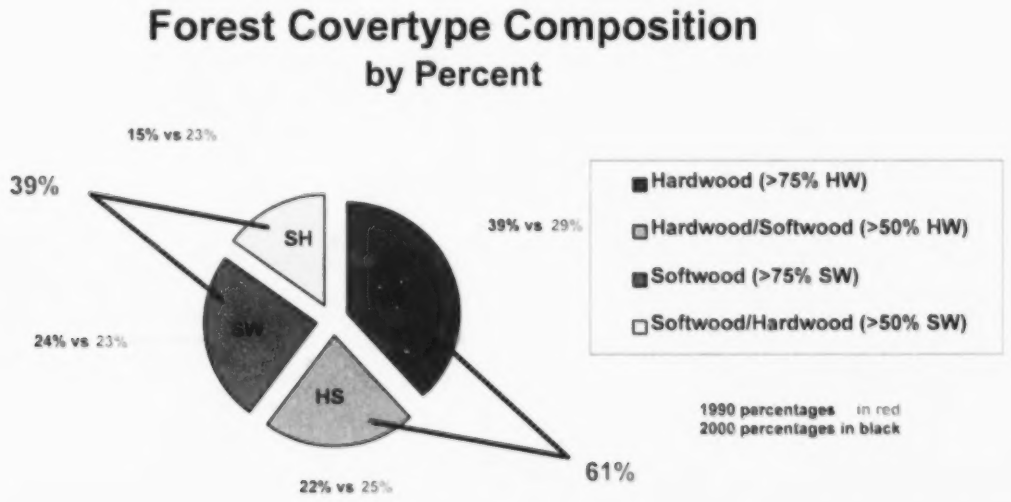
Although there has been some change in the volumes of softwoods and hardwoods over the last decade (Figure 2), the volume relationships have remained essentially the same (Figure 6). The covertype percentages based on area indicate that hardwoods occupy an increased area (Figure 7). Hardwood dominated covertypes account for 61 per cent of the Islands forests while softwood dominated covertypes account for the remaining 39 per cent.

Figure 6



This can in part be explained by both the manner of harvest and the regeneration of cutovers. The mixed wood stands, in particular those that were more softwood than hardwood a decade ago, appear to be the covertypes where change has taken place.

Figure 7



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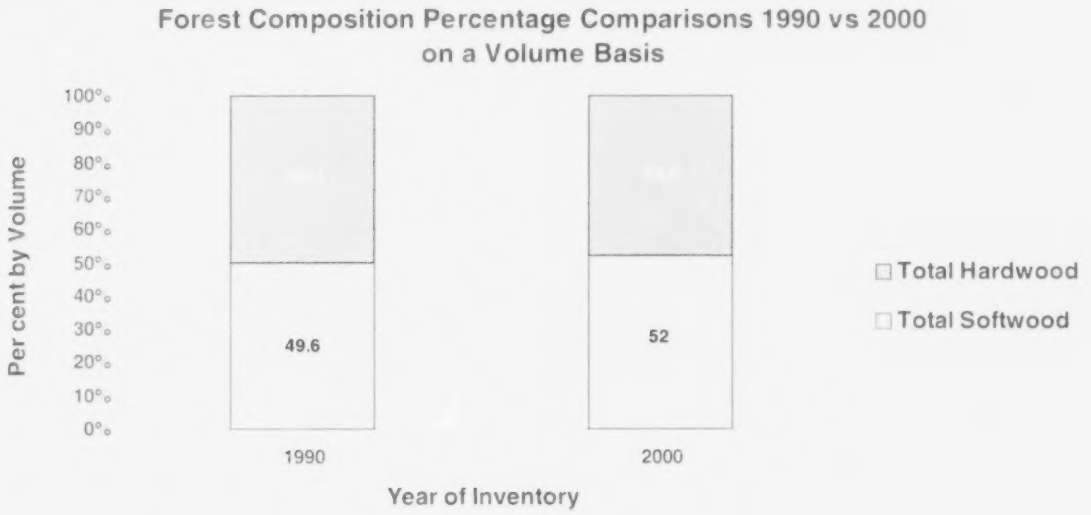

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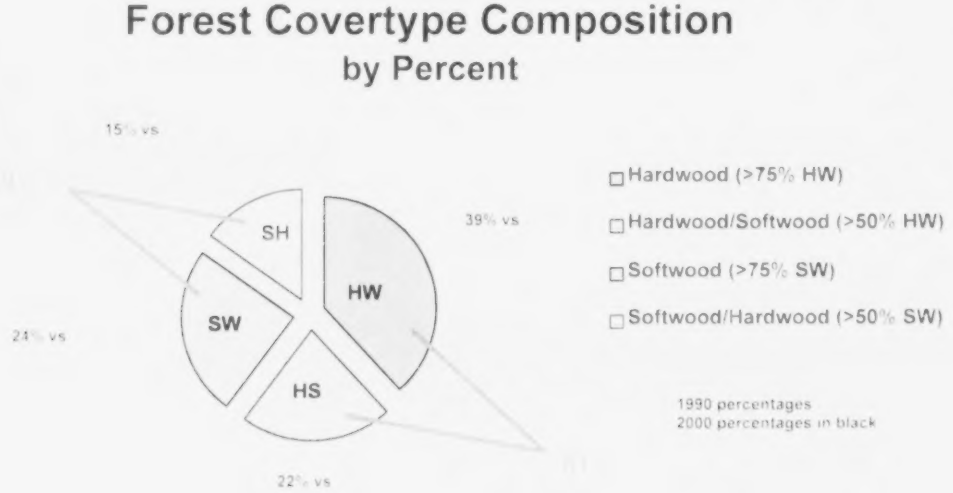
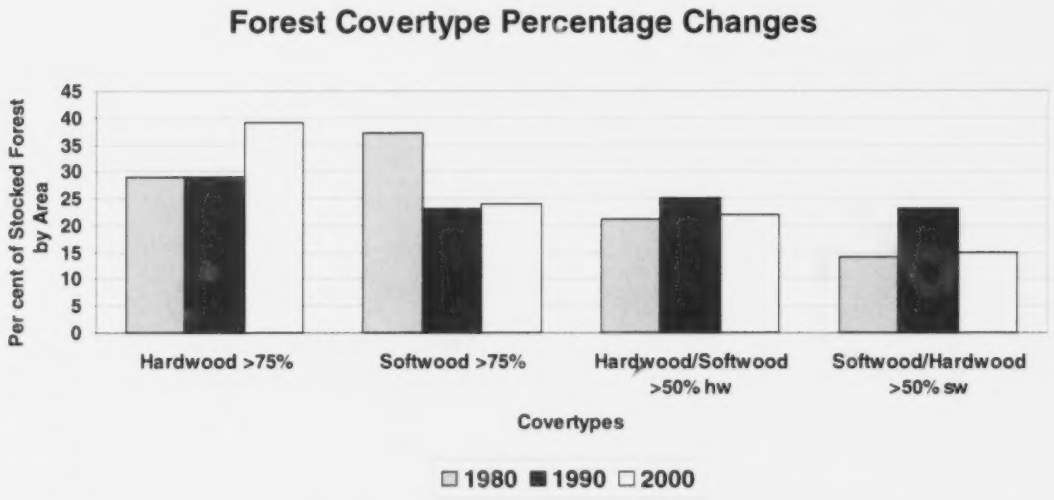
Figure 7



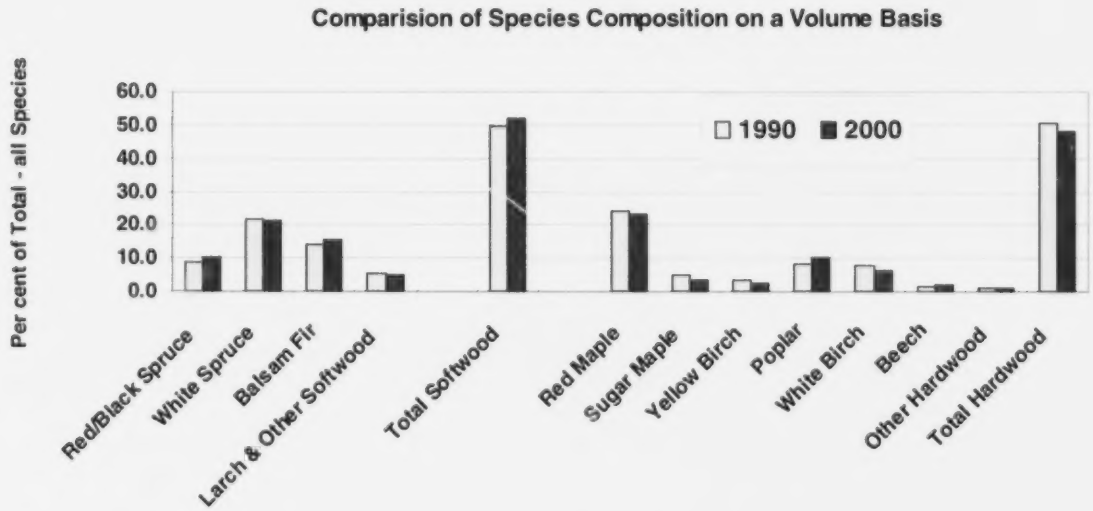
Softwood-hardwood stands have diminished (Figure8), due in part to the natural mortality of softwoods in these stands resulting in more hardwood dominance. Hardwood-softwood stands would also have experienced a decline in their softwood component due to natural mortality. Mechanized harvesting operations have also influenced this change because they can operate in stands with low softwood volumes that were previously considered to be inoperable. When combined, these changes probably account for the increase in hardwood dominant stands.

Figure 8



The fact that almost 50 per cent of the harvest sites were not replanted and ended up regenerating naturally also influenced the increase in hardwood covertypes. Shade intolerant hardwoods (pioneer species) will quickly establish themselves on most cutovers, so this characteristic may also contribute to the hardwood covertype increase.

Figure 9



The state of tolerant hardwoods, generally those species that are long lived and are associated with mature or climax forests and higher product values, is of interest to many forest stakeholders. The inventory identifies roughly 9,000 hectares of tolerant hardwood covertypes. Stands that qualify would include those with yellow birch, sugar maple, beech and / or red oak that comprise 50 per cent or more of the stand covertype makeup. These stands represent about 3.4 per cent of the total forest.

Age Class Distribution

Forests are generally described as even-aged when the majority of the trees at the canopy level are of a similar age. Forests are considered uneven-aged when there is a good representation of the various age classes from seedlings, to saplings to pole stage, mature and overmature. The photo covertype interpretation associated with the State of the Forest Report was not intended to identify, for the province as a whole, even-aged or uneven-aged covertypes. However, a review of the 803 forested PIP sample plots reveals that 23 per cent were uneven-aged.

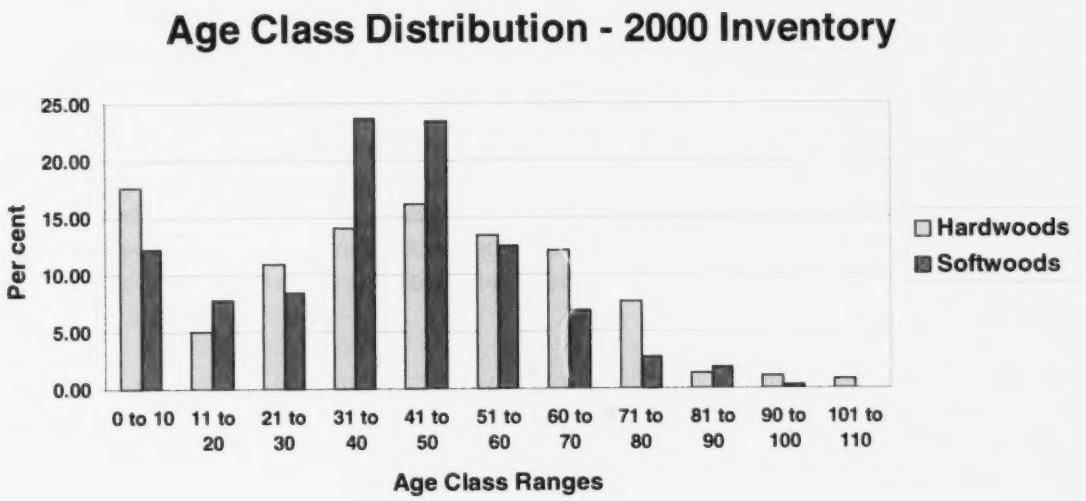
For traditional commercial timber purposes, the preferred forest would have even age management within equal areas of the various age classes represented. As one segment ages to the next category, a younger and equal area of forest moves up to replace it. Eventually, that age class matures and is harvested. The harvested area reverts to the young forest category, beginning the cycle once more. Parallels in agriculture might have crops established in separate fields a week of so apart. The crop in each field takes the same time to mature but they mature a week apart. It provides an efficient way to cultivate and harvest the plants.

For a wide range of reasons related to the growth characteristics of individual species and human modification of habitat (farming) followed by abandonment, much of the Island's softwood forests have an even ageclass structure. Much of this stems from agricultural land abandonment that took place over a relatively short time frame. The result is that much of the forest matures at the same time. The options are to harvest more than what would be considered sustainable over a full rotation or allow a considerable amount of the resource to die on the stump.

Uneven-aged management, where all age classes are represented in individual stands, has not been the model used by industry as it is perceived as inefficient. However, it is the model that small landowners and many others in society, seeking a broader range of environmental benefits from management, seem inclined toward. This type of management requires species which are generally long-lived and which regenerate in the shade of the parent trees. Shade tolerant hardwoods and softwoods, which live a hundred or more years, are often looked upon as candidate species for this type of management. As individual trees mature and are harvested, the openings in the canopy allow increased light to reach the forest floor to promote the growth of younger trees, which in turn mature and are harvested. This type of management is often used where the crop trees have a very high value, as in the case of veneer logs.

Figure 10 indicates that almost 60 per cent of the Island's softwood resource is in the intermediate to mature category (30 to 60 years of age). Growth curves for white spruce, a major component of the softwood resource, indicate that mortality rates increase as trees reach the age of 50 to 60 years. Since much of the softwood resource experiences mortality or significant stem quality deterioration by age 60, there will be a significant reduction in available softwood timber for harvest. The juvenile age classes will not be capable of sustaining the harvest at current levels.

Figure 10



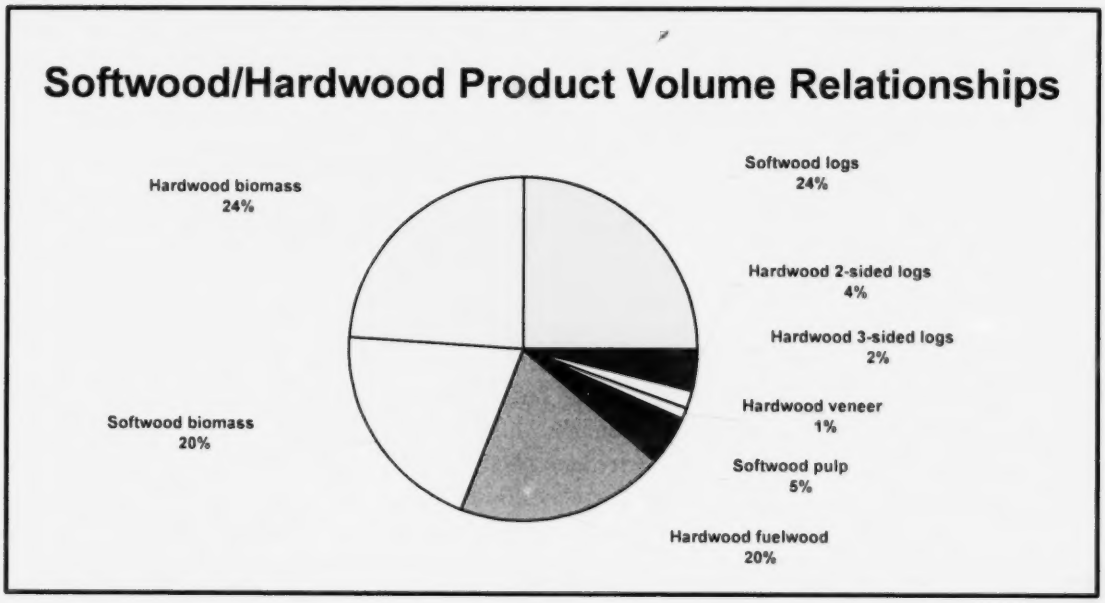
The graph also illustrates that the increased harvest activities over the last decade have created a great deal of regeneration through natural regrowth, stump culture or by planting. The spike in young hardwood regeneration can be explained, in part, by the process of natural succession. On these harvest sites shade intolerant (pioneer) hardwoods often establish themselves more quickly than do most softwood species. This may be seen in the quantity of red maple and poplar (a shade intolerant species) in the species make up of Island forests.

Forest Composition by Volume and Product Type

A concerted effort was undertaken with this inventory to identify individual tree attributes including stem quality and other factors affecting their potential value. This assessment of tree quality also allows an evaluation of a variety of silvicultural treatments to produce forest products. All trees within the 1/25th hectare sample plot and having a diameter of more than 9 cm, were measured and assessed for product potential. The trees, regardless of age, were assessed from an existing or potential product use, which rated the trees on the number of clean (defect free) faces they possessed. The study indicated that high quality hardwood veneers are uncommon, but that other high value hardwood products may merit closer scrutiny for the development of new opportunities.

New sawing technology within the lumber industry over the past decade has created a situation where much of the softwood resource, which would have been categorized as pulpwood ten years ago, is now suitable for sawing. This is illustrated by the high percentage volume of softwood logs (Figure 11).

Figure 11



Hardwood and softwood trees, branches and tree tops still represent a large portion of the product potential within the forest inventory. Although very much an interest ten years ago, these biomass aspects of the inventory are inconsequential now. The biomass market has disappeared with the exception of mill residues being consumed for energy purposes in Charlottetown. This might change in the next decade.

Somewhat surprisingly, there is little change from the 1990 inventory with respect to percentage volume comparisons for the major species (Table 4). This may be seen as supporting both inventory approaches, even though they were ten years apart and did not measure the same plots. However, the current inventory is based on permanent plots which will be visited in future inventories to enable researchers to conduct a direct comparison of plot data from one period to the next.

Table 4

Forest Per Cent Composition Comparisons by volume		
Species	**1990**	**2000**
Red/black Spruce	8.5	10.3
White Spruce	21.5	21.1
Balsam Fir	14.1	15.6
Larch and Other Softwoods	5.5	5.0
Total Softwood	49.5	52.0
Red Maple	24.2	22.9
Sugar Maple	4.7	3.5
Yellow Birch	3.2	2.6
Poplar	8.0	9.9
White Birch	7.8	6.1
Beech	1.4	2
Other Hardwood	1.1	1.0
Total Hardwood	50.4	48.0
Total	100	100

The inventory identifies roughly 9,000 hectares of tolerant hardwood covertypes. Stands that qualify would include those with yellow birch, sugar maple, beech and /or red oak that comprise 50 per cent or more of the stand covertype makeup. These stands represent about 3.4 per cent of the total forest.

Non-timber Values of Island Forests

There is a tendency to confuse forest values with valuation – a monetary measurement. But there are innumerable values associated with forests for which a dollar valuation is an insufficient measure.

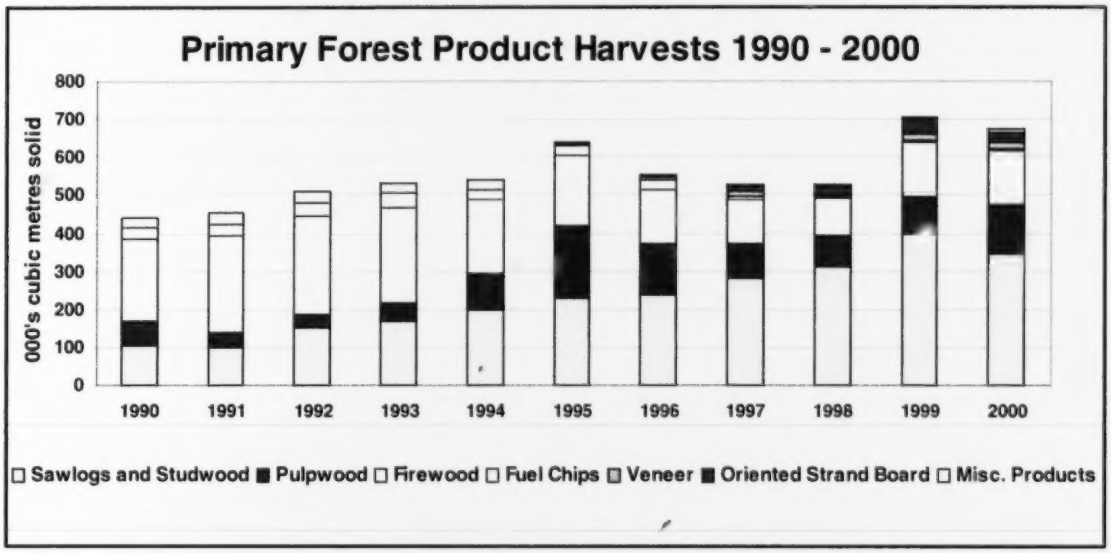
- Forests purify the air we breathe by absorbing carbon dioxide and releasing oxygen.
- Forests are natural carbon sinks that can help to reduce the rate of global warming.
- Forests reduce the velocity of heavy rains, reducing the impact on forest soils and runoff while allowing water to percolate down through the soil to recharge ground water. Forests trap snow, which reduces runoff from snowmelt, which also improves ground water recharge.
- Forests are places of life, death and rebirth that create a great diversity of native animal and plant life. Many different forest types contribute to this diversity, from black spruce bogs to upland hardwoods. Forests provide buds, bark, nuts and berries as food for many animals and leaves at different heights for browsing forest wildlife.
- Nesting and roosting sites can be found in both the tree and shrub canopy and hollow areas of tree trunks.
- Forests are sites of learning. Students, woodlot owners, visitors, and others visit forest interpretive trails such as the demonstration woodlots to learn.
- Forests can be a source of food such as edible berries and mushrooms as well as game birds and mammals.
- Cool, clean water helps to support greater trout populations, while fallen trees create pools and trout cover.
- Forests trap silt from entering streams thus improving spawning habitat.
- Forests shade recreational areas such as hiking trails, wood roads, campsites and parks.
- Forests and fields diversify our landscape creating patterns that are of intrinsic value to Islanders and visitors alike.
- Forests produce Christmas trees, maple syrup, ground hemlock, chanterelle and bolete mushrooms, fruits, hazelnuts, medicinal plants, and much more.
- Forest buffers around homes can reduce heating and cooling costs.

- Spiritual values are important but difficult to describe. How does one describe the sense of peace and well being that the sounds of a bubbling brook, singing birds, or the rustle of leaves in the wind impart? What value is attributed to the sight of brilliant autumn colours, a patch of wild flowers, a nesting bird, the smell of autumn forests, the taste of a wild pear, the warm spring sun in a forest opening or the sense of awe and solitude we get when standing in a quiet forest of large healthy trees? Forests offer places to get away from our hectic lives, something that is precious to all of us because we need to know these places exist and that things are "right with the world".

Regardless of whether we consciously recognize the many benefits provided, forests impact the quality of life of every Islander. We are stakeholders whether we own a woodlot or not. Our interest may not be financial, but we do benefit, and to benefit means there is value. The state of Island forests should be of concern and importance to everyone.

Harvest Statistics 1990 – 2000

Figure 12



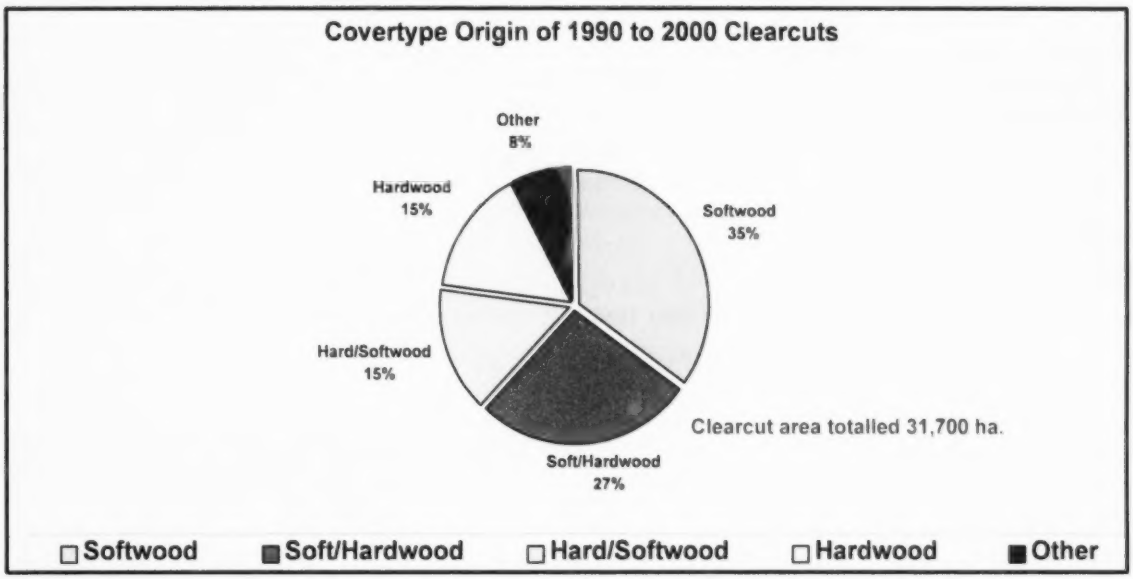
The 1990s saw a number of significant developments in the primary forest products sector. Beginning in the mid 1990s, the Island's logging industry began a drive to mechanize harvest operations. Whereas 90 per cent of the harvest was felled manually in 1990, by 2000 some 80 per cent of the harvest was estimated to have been felled and processed by mechanical harvesters.

Changes in sawmill utilization technologies enabled larger mills to use small dimension logs for lumber production. By 2000, there was a more than 300 per cent increase in the average annual softwood studwood and sawlog harvest. Some of these logs would have been classified as pulpwood sized material in the 1980s, but still, the annual softwood pulpwood harvest more than doubled during this period. Total volumes of both products increased, due in part to the land conversions from forest to agriculture and blueberries.

Firewood and energy chip harvests peaked in the late 1980s and early 90s. The trend to lower fuel oil prices in the mid 90s reduced the domestic demand for fuelwood and essentially extinguished the biomass energy market. However, increased oil prices toward the end of the decade resulted in an increase in domestic fuelwood consumption.

In the latter part of the decade, Island hardwood producers capitalized on new market opportunities in New Brunswick for veneer (for plywood) and Oriented Strand Board (OSB - a type of chip board). Although not large, these markets presented sales opportunities for both high-end veneer logs and low-end intolerant hardwood species – markets which were not realities in recent decades on PEI.

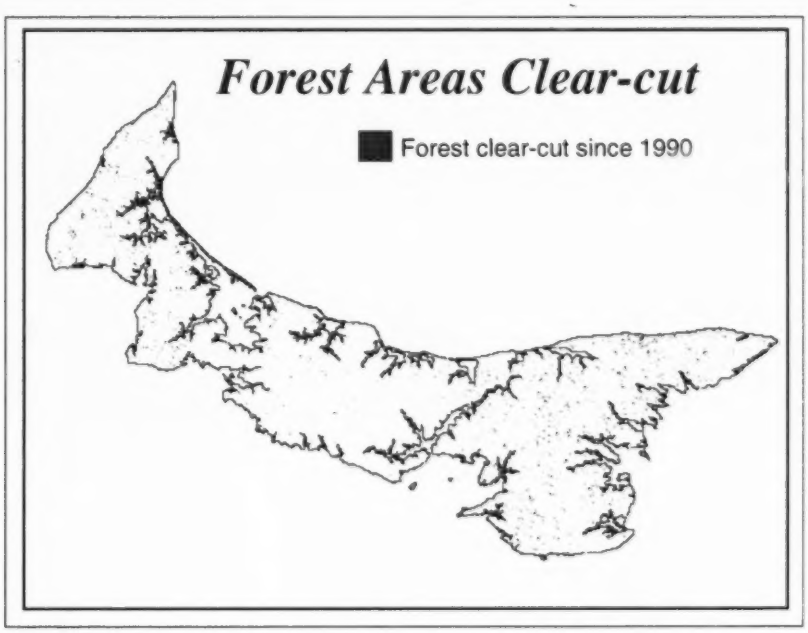
Figure 13



Over the 1990-2000 period, some 31,700 hectares of forest were harvested, and of that amount, 10,515 hectares were identified as having been converted to agricultural uses (Figure 13).

The attached map (Figure 14) identifies the location and concentration of harvests that took place between the 1990 and 2000 inventory periods.

Figure 14 (See Appendix IV for larger version)



Sustainable Harvest Levels

The sustainable harvest curves presented here do not represent any future government strategies or commitments. Rather, these curves simply illustrate several 'what if' scenarios that build upon current softwood forest management strategies. Curves could be developed for a myriad of options or constraints, some of which might not have any softwood fiber production emphasis. The presentation of these curves is solely to illustrate the projected impact of forest management on softwood sawlog production.

The forest industry, like the forest itself, is a dynamic entity. It changes in response to market forces or consumer pressures. By the mid 1990s, it was apparent that softwood harvest volumes were increasing due to land clearing for agriculture and market opportunities for lumber and pulpwood. At the same time, improved sawmill technology allowed the industry to process smaller logs into lumber. Mechanized harvesting equipment, capable of economically processing logs from stands which were previously not merchantable, effectively increased the amount of wood available for harvest. These all combined to influence the harvest volumes that have resulted in a five-year average softwood sawlog harvest volume of 315,000 cubic metres per year. This five-year average annual softwood sawlog harvest volume was almost three times the sustainable softwood sawlog harvest calculated from the 1990 inventory and was nearly double the revised harvest estimates of the mid nineties, which were based on technological changes within the forest industry.

Although forests may be appreciated more for their environmental benefits, there still is a demand for their products. Using a software-modeling tool known as *Woodstock* to assess the outcome of various management scenarios for the long-term growth and production of the forest resource, the Department has been able to make projections regarding sustainable harvest levels. The management model in all cases is built around the harvest of sawlogs, because this primary product has the most significant positive impact on the forest economy.

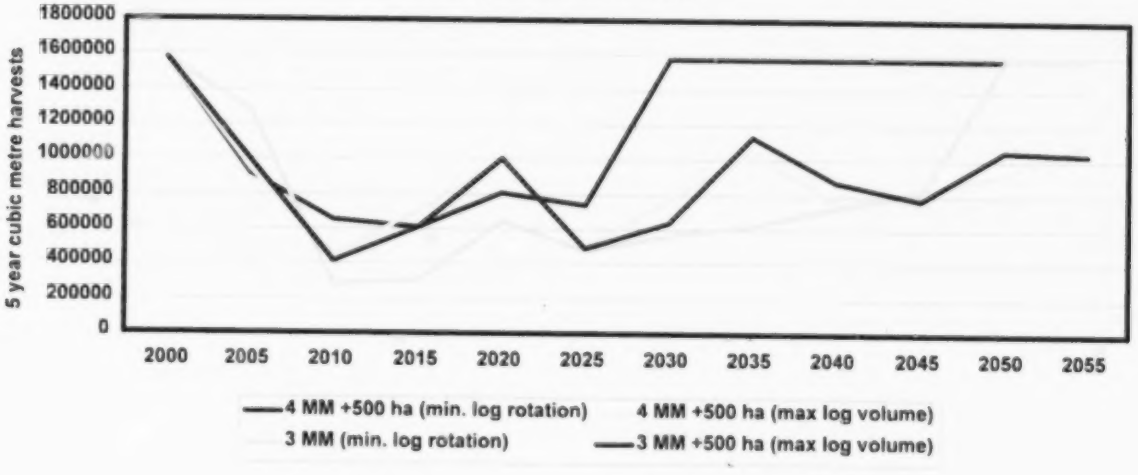
Certain constraints have been used in programming the model. Stand operability has been defined as 8 cords ($48m^3$/ha.) of softwood to the acre (minimum volume to merit industry interest in harvesting); land base availability for harvest, based on a recent landownership and attitude survey[2], has been set at 85 per cent; diameter specifications were set at 9 centimetres diameter at breast height (1.3 metres) for sawlog use; and protected areas and National Parks were removed from the model. The harvest parameters also included variables whereby the computer was programmed to maximize sawlog volume or to minimize the time to harvest for logs. Maximizing sawlog volume involves allowing the computer to grow the forest to the point where the greatest sawlog volume is realized, then harvest it.

Minimizing the time to harvest involves programming the computer to harvest the forest when the minimum operability requirement for sawlogs has been attained. Although there is not a specific model of how the current harvest is planned by the industry, it is known that young softwood stands, which have not reached their biologic maturity, are often harvested as are mixedwood stands which have lesser quantities of softwood fibre than do pure softwood stands. This reality is most closely representative of the

minimum time to harvest approach used in the Woodstock computer program.
Figure 15 compares several harvest patterns for a variety of silvicultural strategies ranging from no silviculture to various levels of planting with a fixed level of silvicultural improvement (500 ha. of spacing) in young stands. The graph compares the available softwood sawlog harvest under various scenarios and illustrates that there is not a great difference in the short-term availability, regardless of silvicultural inputs. However, it does illustrate that a more aggressive planting program of 4 million seedlings a year, combined with 500 hectares of spacing in young stands, would enable current softwood sawlog harvest levels to be realized again in about 30 years. Regardless of inputs, the current softwood harvest levels are not sustainable in the short-term.

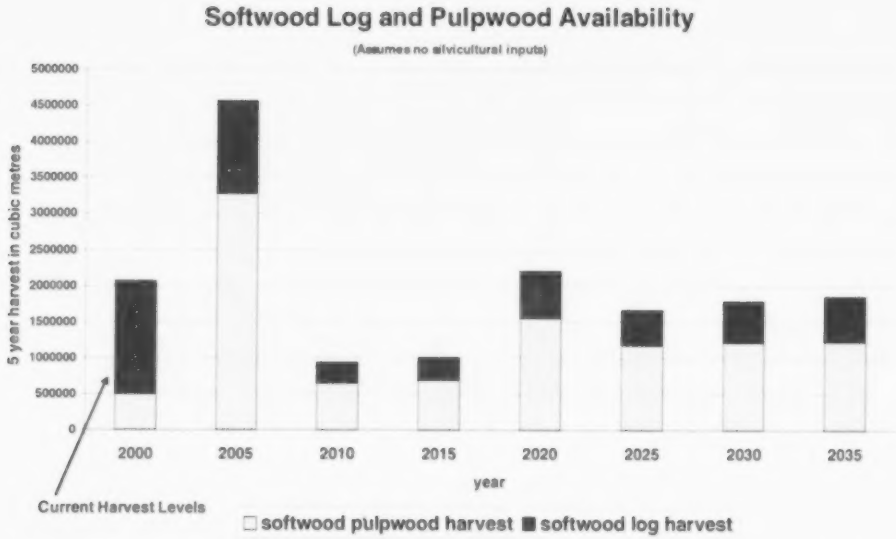
Figure 15

Comparison of Softwood Sawlog Harvests Under Various Input Scenarios



Over the short term, forest management activities will have little impact on the sustainable harvest of softwood sawlogs, because it takes about 20 years for silvicultural improvements to realize merchantable fibre gains and 40 years for most plantations to produce any sizeable commercial products (trees with diameters in excess of 25 to 30 centimetres).

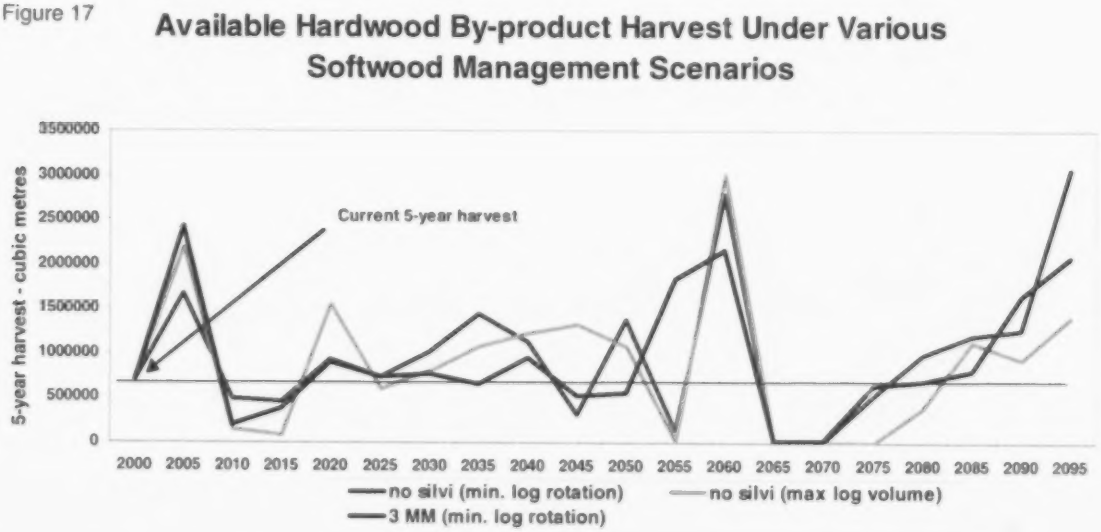
Figure 16



The graph above illustrates the situation where there are no silvicultural inputs and no plantings, but softwood sawlog harvests are maximized. The first column represents the five-year average harvest as of 2000, not the potential. From 2000 to 2005 the total softwood volume available to be harvested is in excess of the five-year average, although sawlog volumes will begin a significant decline in availability. The graph reveals that by 2010 and 2015 there will not be sufficient softwood resources to sustain the current harvest levels of both sawlogs and pulpwood. This is because many of the trees in the 30 to 50 age classes will have either been harvested or matured and died.

The majority of the hardwood harvest comes as a by-product of softwood harvests. Figure 17 shows several scenarios including no silvicultural inputs (softwood) and no harvest constraints; no silvicultural inputs, but a prescription to attempt to harvest 315,000 cubic metres of softwood logs annually; and 3 million seedlings planted and the softwood log harvest attempting to reach 315,000 cubic metres annually. Although there are some peaks and valleys to each curve, the current total hardwood harvest appears to be sustainable for a number of decades.

Figure 17


Available Hardwood By-product Harvest Under Various Softwood Management Scenarios
5-year harvest - cubic metres
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Current 5-year harvest
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095
no silvi (min. log rotation)
no silvi (max log volume)
3 MM (min. log rotation)

Nursery Production by Species

With the establishment of the genetic improvement program in the 1970's and the Dover Seed Orchard in 1986, the province established the means to be self-sufficient in quality seedlings from on-Island genetic sources. Although still somewhat reliant on nature to create good seed crop years, the Department has achieved its goal of self-sufficiency in seed production. White, black and red spruce, along with white pine, eastern larch and balsam fir (for Christmas trees) are the species that have been developed through the Department's genetic improvement program. Improved seed from these tree species is now used in the Forest Renewal Program to reforest cutover areas. Improvements in volume and height growth (above that which is realized in natural stands or with unimproved plantation stock) are expected to exceed 20 per cent.

There currently are about 19 species that form the basis of the Forest Renewal Program, with a number of other species grown for special planting projects (see Appendix 3 for list of common names and abbreviations). Softwood species dominate the planting program because one of the stated goals of the Department has been to maintain, as much as is possible, softwood covertypes through reforestation. This goal recognizes that cutover stands tend to revert to low value hardwood species. Although this is not an environmental negative, the softwood reforestation emphasis recognizes that the populations of wildlife associated with softwood stands will decline without interventions to maintain the softwood canopy.

Table 5

Nursery Production of Softwood Species for Forest Renewal

(000's of seedlings)

YEAR	RP	WP	AP	RS	WS	BS	eL	JL	BF	NS	EH	EC	Total
1991	371	287	73	0	430	785	417	0	205	9	0	0	2,577
1992	337	402	62	0	507	970	377	0	218	0	0	0	2,873
1993	331	484	65	48	764	724	287	52	229	66	3	1	3,053
1994	199	499	62	99	658	111	0	0	185	130	3	4	1,949
1995	199	425	17	64	537	292	209	239	59	293	5	9	2,346
1996	150	429	24	64	470	243	199	119	87	343	4	11	2,142
1997	214	417	25	67	581	399	297	176	89	506	5	6	2,783
1998	60	319	9	62	539	429	221	119	67	279	2	3	2,107
1999	81	285	7	91	770	535	220	82	25	328	1	2	2,426
2000	94	243	6	104	1,198	829	217	74	4	177	0	1	2,949
Total '91 to '00	2,036	3,790	349	598	6,455	5,316	2,444	859	1,167	2,132	22	36	25,204
Total '81 to '90	3,337	454	484		3,327	6,442	2,499	162	1,415	1		26	18,147

(See Appendix II for species codes)

Table 6

Nursery Production of Hardwoods and Miscellaneous Softwoods
(000's of seedlings)

YEAR	YB	RO	WA	WB	SM	BA	CBS	SP	APP	EO	NM	RM	EM	HP	WR	CN	JP
1991	0.9	0.7	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1992	29.9	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	37.1	4.4	1.0	2.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994	6.1	5.2	9.7	3.0	2.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1995	12.4	9.5	10.1	3.7	0.0	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	11.9	10.3	1.3	4.3	0.5	0.0	3.7	1.2	0.6	0.3	0.7	0.6	0.3	0.1	0.3	0.1	0.0
1997	7.4	3.2	5.2	0.9	0.3	0.0	9.6	3.0	0.0	0.0	0.0	0.1	0.3	0.2	0.0	0.1	0.0
1998	5.5	2.6	3.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1999	1.5	2.5	3.6	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	5.8	4.0	4.9	1.1	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.4	0.0	0.0	13.4
Total '91 to '00	118.6	42.3	39.5	16.4	5.2	0.8	13.9	4.1	1.1	0.3	0.7	2.5	0.7	0.7	0.3	0.2	13.4
Total '81 to '90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.5

Red oak, yellow birch and white ash, produced at the forest nursery, were used in experimental planting and density trials established in the first half of the decade. Similar trials based on combined plantings of yellow birch and eastern larch were established as well. These initiatives were part of the reintroduction of hardwood into the Department's seedling production program, the hardwood component of which originated in the mid 1970's.

The Department responded to the needs of watershed enhancement groups through the production of stock for either planting in community nurseries, with subsequent lifting and planting in riparian zones, or direct planting in riparian areas. In addition, seedlings were grown for Christmas tree plantation establishment, for the creation of agricultural and urban hedgerows, and for wholesaling to local private nurseries.

Private Land – Forest Management Activities

It is evident that the discontinuation of federal forest improvement programs in 1993 had a significant impact on the amount and the type of work that was done in the latter years of the decade. Infrastructure support for roads, culverts, bridges, and boundaries ceased while stand improvement (pre-commercial and commercial thinning) was reduced. The decrease in thinning may also be attributed to the fact that many suitable stands had already been thinned or harvested. As well, the forest industry had shifted away from silviculture and toward harvesting. The Province, after consultation with industry and woodlot owners, redirected its resources primarily to reforestation where it was felt that the best return on investment could be realized.

Table 7

Forest Management Activities
1980-2000
Private Land

YEAR	Road Constr. (km)	Culvert #	Bridges (sq. m)	Bound. (km)	Stand Improve. (ha.)	Pre comm. thinning	Comm. thinning (ha.)	Prune #'s	Site* Prep. (ha.)	Plant (ha.)	Plant Maint. (ha.)
1980	6	11	0	26	34			0	134	19	2
1981	5	45	0	14	195			0	160	102	4
1982	29	18	5	172	893			0	182	133	2
1983	32	28	1	80	767			0	241	287	62
1984	49	37	18	123	660			0	562	230	177
1985	64	40	93	149	518			0	865	316	247
1986	73	25	87	118	378			0	730	612	282
1987	96	48	37	130	409			0	867	759	211
1988	62	40	22	88	216			0	725	938	211
1989	89	50	40	99	251			0	826	556	315
1990	78	51	77	82	354	170	194	0	795	715	580
1991	96	65	31	105	387	210	177	0	1,163	911	672
1992	100	74	33	76	347	187	160	0	1,219	987	767
1993	110	82	41	47	288	116	172	0	897	1,069	757
1994	0	0	0	0	274	123	151	0	807	628	593
1995	0	0	0	0	52	33	19	0	562	702	680
1996	0	0	0	0	128	56	72	0	674	669	645
1997	0	0	0	0	26	25	1	0	867	848	466
1998	0	0	0	0	24	24	0	0	858	821	553
1999	0	0	0	0	16	16	0	15,902	730	998	542
2000	0	0	0	0	7	12	0	8,880	764	898	656
TOTAL	889	614	485	1,315	6,234	972	946	24,782	14,496	13,204	8,424
Total 81 - 90	577	382	380	1,055	4,641	170	194	0	5,953	4,648	2,091
Total 91 - 00	306	221	105	228	1,549	802	752	24,782	8,541	8,531	6,331

After the cessation of the Forest Resource Development Program funding, the province created a Forest Renewal Program to support the reforestation of private land harvest sites. Through this program, industry was required to remit $2 for every cord of softwood harvested, processed on or exported from the Island. Participating landowners also contributed $100/ha. to the planting program through a plantation establishment fee. The Province's contribution to the program amounted to 70 per cent of the cost to reforest private land while the industry and private owner share totalled 30 per cent.

The strong environmental standards of the FRDA were continued in the new program. A shift from raking and burning of brush piles to the use of anchor chains as site preparation were two improvements made to lessen negative environmental impacts. A switch in emphasis to manual plantation maintenance, from a more chemical based approach, allowed for a greater diversity of native hardwood species to remain within softwood plantations.

Since the origin of a Forestry Division in the 1950s, hedgerow establishment has been a component of private land forestry programming. In the late 1990s, the Agriculture Environmental Resource Conservation Program (AERC), implemented by the Department, provided incentives for hedgerow establishment, which used native tree species produced at the J. Frank Gaudet Provincial Tree Nursery for this private land program.

Provincial Forests – Management Activities

The Provincial Forest covers some 18,900 hectares of government-owned land that has been assigned to the Department of Agriculture and Forestry for management. This land represents about 3.3 per cent of the Island's total land base and 7.2 per cent of the total forest land base.

While the annual sustainable softwood harvest estimates have been exceeded on private lands, softwood harvest activities on Provincial Forest lands have been well within these estimates. This is primarily due to the Department's management philosophy of multiple use forests for greater societal benefits.

Although the province did not receive direct support for forest improvement work through the Forest Resource Development Agreement (FRDA), the department was expected to contribute a percentage of the federal commitment to Provincial Forests. With the demise of the FRDA in 1993/94, there was a drop in Provincial Forest stand improvement work as the province redirected its expenditures to the Forest Renewal Program on private land. Even so, the province's commitment to forest management on public lands remained fairly consistent with the levels of achievement during the 1980s.

Table 8

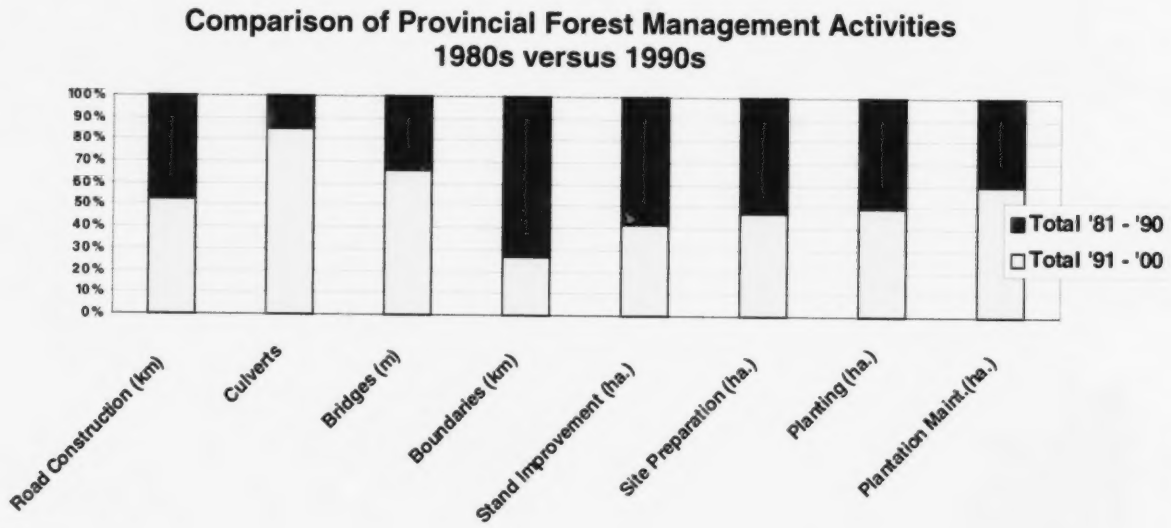
Forest Management Activities on Provincial Forests

Year	Road Constr. (km)	Culverts	Bridges	Bound.(km)	Stand Improve. (ha.)	Site Prep. (ha.)	Planting (ha.)	Plantn. Maint. (ha.)
1991	29.0	22.0	4.0	19.0	94.0	219.0	121.0	114.0
1992	27.0	39.0	4.0	32.0	67.0	236.0	174.0	152.0
1993	28.0	20.0	4.0	10.0	49.0	240.0	158.0	197.0
1994	28.5	18.0		3.7	18.0	220.0	111.0	55.0
1995	6.0	2.0	1.0		7.0	140.0	135.0	140.0
1996	1.8	2.0	5.0	2.6	15.9	107.1	104.2	202.4
1997	9.7	8.0			3.0	117.6	120.8	50.8
1998	3.0	4.0			7.0	111.2	171.5	215.4
1999	2.8	3.0	5.1		18.0	78.3	97.3	99.2
2000	6.7	4.0			23.9	86.7	80.8	53.6
Total '91 - '00	142.5	122.0	23.1	67.3	302.8	1,555.9	1,273.5	1,279.4
Total '81 - '90	128.0	21.0	12.0	181.0	424.0	1,718.0	1,291.0	847.0

In addition to the work indicated in the table above, significant work was undertaken to expand the recreational and educational opportunities in the Provincial Forest. Thus, public consultations were held on the creation of a Provincial Forest system identifying 22 general areas where strategic acquisitions would enhance the multiple benefits possible from larger areas of contiguous land. The Provincial Forest system was designated in 2000, a logo was designed for signage, and the Provincial Forest signs were erected at many of the forest road and public road intersections so these lands could be identified and be used for recreation by the public. In addition, it allowed the public to assess the state of the Provincial Forests.

Some of the additional non-timber activities undertaken include the following: the Brookvale Nordic Ski trails were expanded and a special forest enhancement program was initiated to ensure that forest cover was retained and improved along the trails; the Department partnered with the Souris Striders in the creation of the Grant Road Ski Trails; a birding and hiking trail was created in Dromore; a walking trail was created in Cambridge; a recreational youth fishery pilot project was facilitated through the leasing of a burrow pit pond to O'Leary Wildlife Federation; the Provincial Forest Fall Frolic cross-country run through the autumn foliage was established in conjunction with the PEI Roadrunners Club; a license was provided to a snowmobile club to enhance snowmobile trail development to areas off the Confederation Trail; an expert review was conducted of the potential for sustainable forest mushroom harvesting; research trials were established for a variety of hardwood improvement techniques as well as an assessment of growth rates for ground hemlock harvesting to derive sustainable harvest guidelines; and forest wildlife enhancement was conducted on many properties.

Figure 18



A number of initiatives were undertaken on Provincial Forests to draw greater public attention to the non-timber and non-traditional values of forests and forest management. Thousands of students were introduced to forest management concepts by visiting the Demonstration Woodlots or through in-classroom presentations. Over 200,000 trees were planted on Provincial Forest land through Scout Canada's *Trees for Canada* and other community organization plantings. Work was also conducted to determine sustainable harvest measures for ground hemlock and forest mushrooms. Winter harvest projects were implemented for pilot ground hemlock and balsam fir tipping initiatives.

Activities in Support of Forest Management

Private Land Programs

From 1990 to 1993, the primary vehicle for influencing forest management on private lands was the ***Canada/Prince Edward Island Forest Resource Development Agreement (FRDA)***. Until its termination in 1993, the FRDA provided landowners with a wide range of programs and services designed to encourage and support managed forests.

The ***Forest Renewal Program*** was established in 1996 along with regulations that required the forest industry to contribute $2/softwood cord to support reforestation. Approximately $1.5 million was generated and about 5000 hectares were planted since the program's inception.

In 1997, the Department, in cooperation with members of the Island's forest community, developed and introduced a ***Voluntary Code of Practice for Forest Contractors***. The voluntary code was designed to provide the logging industry with a set of business, harvest, and forest environment guidelines and standards. Unfortunately, the level of compliance was not high, so in 1998 efforts began to develop a regulated code of practice for the harvest of softwood and hardwood resources. However, landowner resistance and lack of public support led government to withdraw the proposal in early 2000.

Forest Fire Management Initiatives

Forest fire control and prevention has taken a fairly high profile over the last decade. The implementation of a burning permit system along with the reporting of daily fire weather indexes through the local media has been quite successful in reducing the annual occurrence and magnitude of wildfire damage. Coordination of fire response between government and volunteer community fire brigades has been improved and can also be credited with reducing losses of forest and other private property.

Public and Stakeholder Information Efforts

Over the course of the decade, the Forestry and Land Resource Modelling Section produced approximately 30 **Management Notes** for general distribution. These publications cover subjects from fuelwood harvesting to guidelines for harvesting ground hemlock for the pharmaceutical industry. Surveys of plantation successes and provenance trials, and historical information on plantations and environmental events along with information on growth and yield were also covered in these reports.

Publication of the **Forest Wildlife Manual**, and the launch of a forestry website were successful initiatives designed to address public needs for forest management related information. A four part series of research papers, titled **Analysis of the Ground Flora and Other Data** based on the 1990 forest inventory, was undertaken in cooperation with Dr. Douglas Sobey of the University of Ulster in Northern Ireland.

In addition, the **Project Learning Tree** and the **4H Great Outdoors Program** were educational projects that addressed

school aged children as future stakeholders in the forest. In addition the **Science, Technology, and Society Course - The Forest: Understanding it, Using it, and Keeping it** was utilized as part of the grade 10 curriculum until the mid 1990s.

Wood Products Marketing

The creation of a secondary wood product marketing specialist position in the mid part of the 90's was instrumental in increasing the role of value added forest products to the provincial economy. It was estimated that the secondary wood products sector was contributing as much as $25 million to the economy annually by the end of the decade.

Chainsaw Training

Silviculture training for government seasonal forest workers was improved. These initiatives were undertaken in response to concerns that injuries within this sector of the forestry workforce were increasing.

Industry Support

Support grants were provided to the Forest Improvement Association to ensure that forest management information was disseminated to the forest community and the public, and through these groups back to government.

Consultations

Debate through the **Round Table on Resource Land Use and Stewardship** as well as the proposed, but never implemented, **Forest Contractors Code of Practice** drew ideas from stakeholders as to how the forest resource should be managed.

Research

Hardwood planting trials were undertaken in the Provincial Forest to assess how best to incorporate these species into forest improvement and renewal programs. This in turn, influenced the variety of species produced at the J. Frank Gaudet Tree Nursery. Nineteen species now form the basis of the seedling production program. Special projects such as Watershed Planting Programs and the Trees For Communities Program allowed the Department to broaden its forest renewal mandate.

These are just a few of the initiatives undertaken in support of better Forest Management in the Province in the last decade.

Forest Fire History

Although some areas of the Island are reputed to have been almost completely burned over since European habitation (generally as a result of land clearing practices which got out of control), fires in the past half century have not been very large, with the exception of the Portage fire in 1961, when close to 6880 hectares were burned-over in Prince County. Since then the area of forest burned has generally been kept below 100 hectares annually (exceptions being 1200 ha. in 1977 and 500 ha. in 1986).

An average of 32 fires and 79 hectares were burned annually between 1991 to 2000, as compared to an average of 47 fires totaling 185 hectares of forest that were consumed in the previous decade. This drop in fire occurrence and forest area lost may be attributed to greater public awareness of fire weather index conditions (fire weather index reporting initiated in the early 1990s) or because of the rapid response of a well-organized government and community-based forest fire suppression organization.

Figure 19

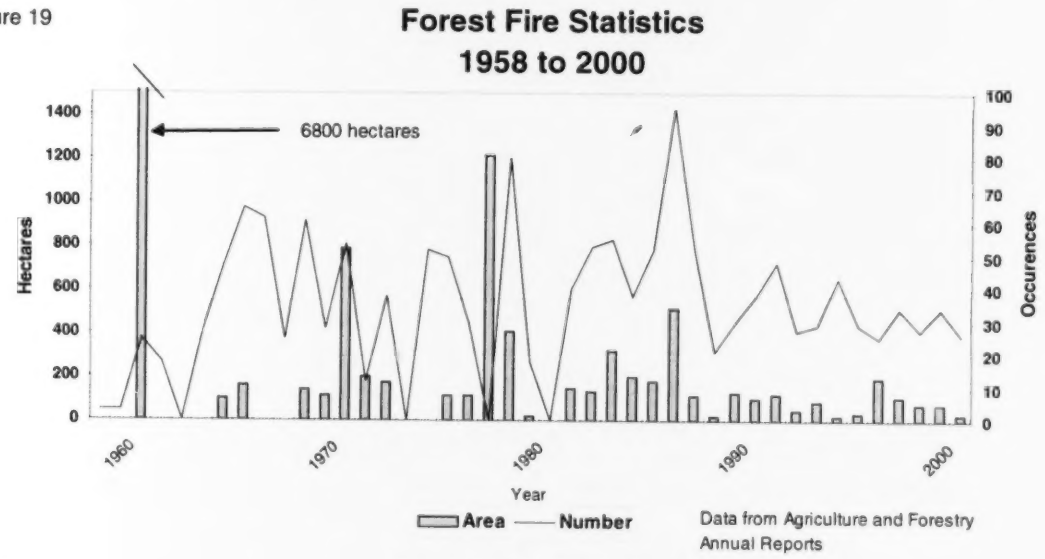
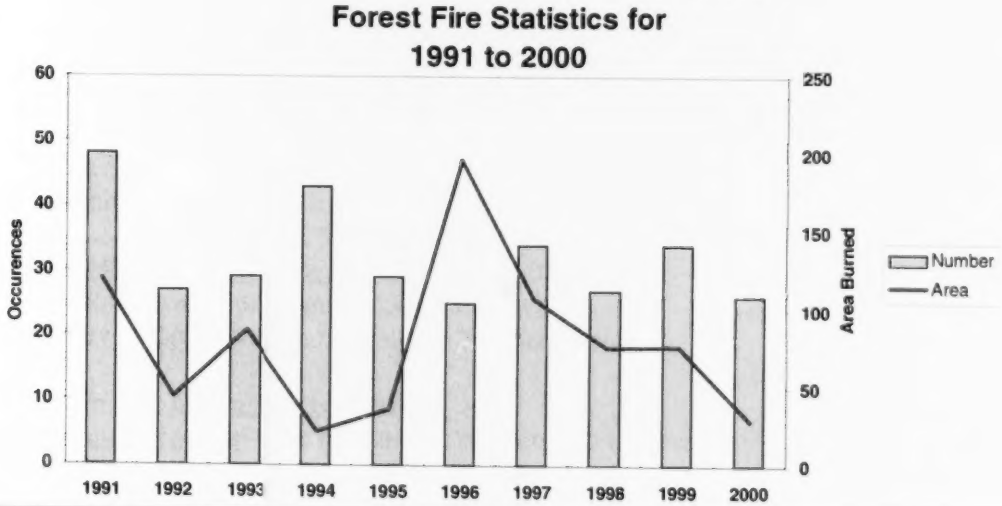


Figure 20



Environmental and Non-timber Forest Information

The 2000 forest inventory process also collected a great deal of non-timber information on Island forests. While an analysis of the non-timber information was not part of the State of the Forest Report, the data will be used in future by a wide range of groups and agencies to obtain benchmark information and insights into a wide range of forest values.

Wildlife – At each inventory plot, information was collected on tree species, height, diameter, crown closure, and health. This data could be used to determine how specific Island forest types meet the basic habitat requirements (food source, nesting space, etc.) of many forest invertebrate, reptile, amphibian, mammal, and bird species. The distribution of nesting cavities, nests and potential snag trees was also collected.

Biodiversity – Within each sample plot, data was gathered on all vascular forest plants. This included species and frequency, which can be used to determine which plants occur in which stand types.

Soils – Detailed information on forest soils has been collected since the 1990 inventory including soil depth, texture, and profiles. With the establishment of the 803 PIP's, researchers can now revisit specific forest sites to measure how these soils develop over many years.

Coarse Woody Debris – The 2000 study also looked at the coarse woody debris found at each site. This information has implications for the determination of carbon sequestration rates for Island forests and is an important element for many wildlife species.

Recreation and Aesthetics – The species distribution information could be used to determine the best routes for visitors to view the Island's spectacular fall foliage. Other areas could be identified for their value for forest birding or forest wild flowers or ecotourism - opportunities which have yet to be fully realized on PEI

Future Programming

Regardless of market conditions for forest products, there is a continuing need of forests for their multitude of societal benefits. Planting and spacing programs are needed to reduce the sustainable softwood volume gap that is rapidly approaching and is expected to last for the next 30 years. Silvicultural training programs are also needed to put a skilled workforce in place to do non-landowner silviculture and stand improvement treatments.

It may now be time for the forest industry and landowners to play a more significant role in the management or private land forest resources. A more active role in forest renewal by the forest industry may result in a greater non-timber emphasis for government.

Public Forests and in particular, Provincial Forests, will be looked to for leadership with respect to forest management. These forests represent less than 10 per cent of the land base, but have the potential to demonstrate wealth creation, protection of sensitive areas, non-timber values, and broad education objectives.

Opportunities

The 'Knowledge Economy' is a reality and the Corporate Land Use Inventory, of which the Forest Inventory was an integral part, will be an important resource for governments, industry, educational institutions and individuals to use to better understand and make plans for the future of the Island's resources.

The extent of the quality of hardwood resources, which have, until now, been mainly treated as low value products, is better known as a result of the quality assessment survey aspects of the forest inventory. This knowledge base may encourage greater value-added utilization of these species by the secondary manufacturing sector.

The cataloging of plants found within the PIPs may also open opportunities in such areas as pharmaceuticals and neutraceuticals. The plant inventory could also improve the ability to look at herbaceous plant conservation programs.

Other non-timber aspects of the forest inventory combined with the CLUI could have importance to ecotourism. For example, the identification of covertypes along roads and biking trails could be used to highlight where the best fall colours could be experienced. The CLUI could as well allow society to explore landscape level solutions to various issues that arise with respect to policy development and proactive program development and planning.

Tree enhancement and enrichment programs in watercourse and wetland buffers could be expanded to achieve greater societal goals not only in water, but forest resource conservation.

The potential role of trees and shrubs in the conversion of high slope agricultural lands to non-row crops will be explored.

In conjunction with a variety of partners, improved landscape level hedgerow planting programs will be developed.

Tax incentives, environmental service contracts and other options will be explored as tools to encourage greater forest management.

Conclusions

It is important to note that the Island's forests, as described in the State of the Forest Report, are the result of thousands of choices made independently by landowners and the forest industry.

The State of the Forest report indicates that the resource continues to shift toward hardwood-dominated covertypes and that the primary softwood forest products industry will suffer significant shortfalls over the next few decades, with the ever increasing necessity of roundwood softwood log imports for processing into lumber. There will be more harvesting in mixedwood stands to salvage merchantable softwood.

Although forest improvement initiatives can improve the prospect of sustaining harvest levels in the longer term, it takes at least 20 to 30 years for these efforts to influence the sustainable softwood harvest.

The loss of forest land to other uses may have an impact on the public's understanding and concern for protection of forest resources. It is important to realize that forests are being increasingly appreciated for their non-timber qualities. Forests are integral to our landscape, wildlife, ground water, air quality, recreation potential and many other values that matter to the people of this province.

How we prioritize and manage all of these values is often not a straightforward process. It is up to the forest community and Island society to determine what the future of our forest will be and to develop a new Forest Vision for public and private forests. Hopefully, the information contained in this report will assist these discussions and help Islanders from all walks of life to determine the best course for the forest and the forest community.

Appendices

Appendix I

Footnotes

1 Management Note 28 – *An Examination of Forest Ownership in Prince Edward Island*, by W.M. Glen, June 2002, PEI Department of Agriculture and Forestry (page 1)

2. The Woodlot Owners of Prince Edward Island: A Survey of Their Forest Use, Management and Values, by Tom Beckley (CFS), Solange Nadeau (CFS), Robert Short (UNB), 2002

3. List of Species Produced at the J. Frank Gaudet Tree Nursery 1990-2000

Appendix II

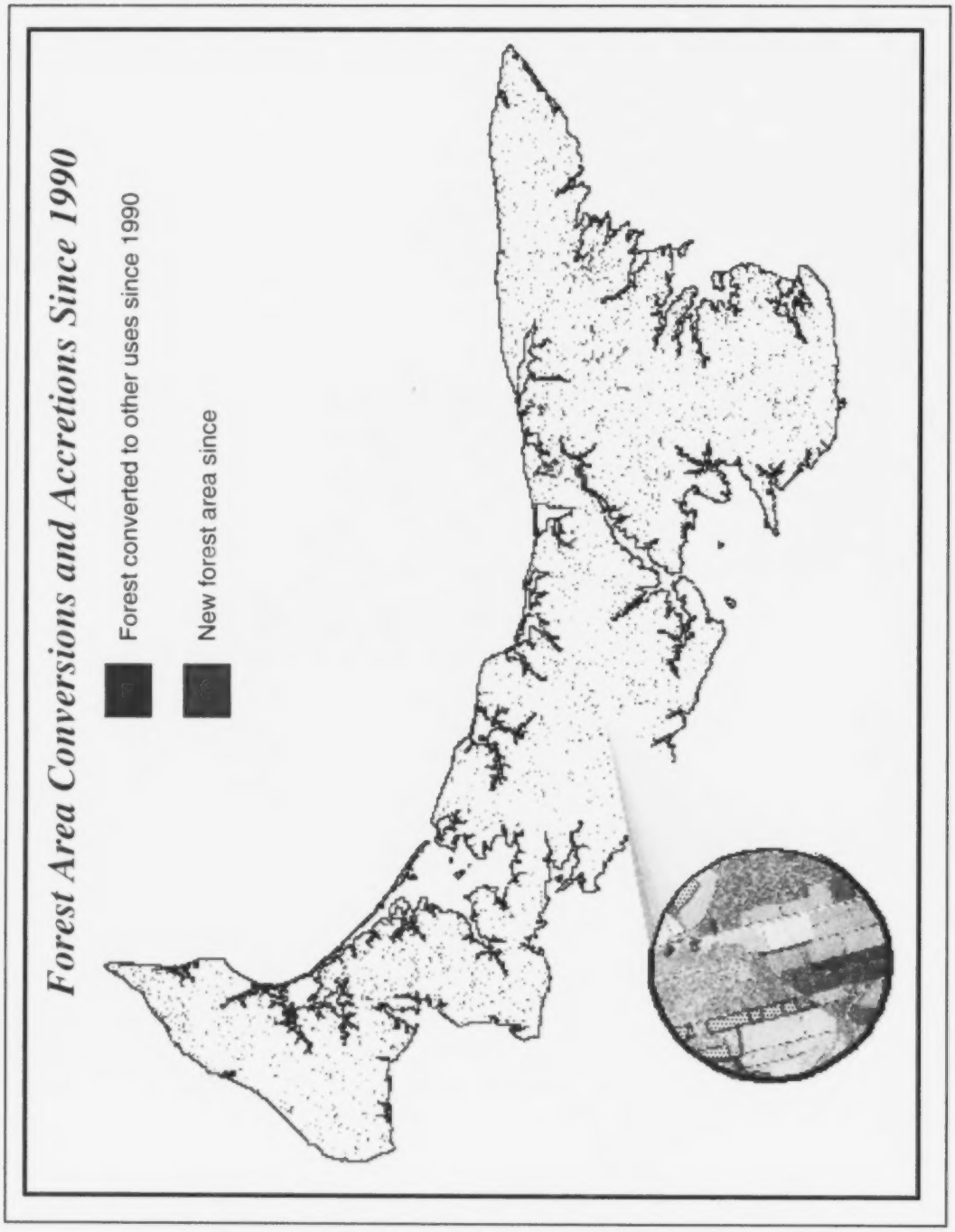
List of Species Produced at the J. Frank Gaudet Tree Nursery 1990-2000

Common Name

RP - Red Pine
WP - White Pine
AP - Austrian Pine
RS - Red Spruce
WS - White Spruce
BS - Black Spruce
eL - Eastern Larch
JL - Japanese Larch
BF - Balsam Fir
NS - Norway Spruce
EH - Eastern Hemlock
EC - Eastern Red Cedar
YB - Yellow Birch
RO - Red Oak

WA - White Ash
WB - White Birch
SM - Sugar Maple
BA - Black Ash
BS - Blue Spruce
SP - Scots Pine
APP - Apple
EO - English Oak
NM - Norway Maple
RM - Red Maple
EM - Elm
HP - Hybrid Poplar
WR - Wild Rose
CN - Chestnut
JP - Jack Pine

Appendix III



Appendix IV